

# NCVweb: An Interactive Web-Based Tool for Viewing ARM Data

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## Introduction

Our group at Mission Research Corporation has set out to develop a number of new data analysis and visualization tools to assist the Atmospheric Radiation Measurement (ARM) community. NCVweb is such a tool and allows for easy viewing of ARM datasets using a Web browser. This tool helps to eliminate the need of and problems associated with downloading large volumes of data, installing and configuring visualization software, or writing custom data exploration software. Unlike generic NetCDF data viewers, NCVweb understands ARM file conventions, which assists in generating better-looking plots. It does a number of things that would be time-consuming or difficult for users to do themselves, especially users new to ARM formatted files. The Web page at <http://arm.mrcsb.com/> will maintain a listing of sites using this utility.

NCVweb has the following capabilities:

- Produces a detailed table of file contents (variable names, dimensions, units, and descriptions).
- Detects and does not plot data points designated as “missing.”
- Generates statistics on-the-fly, such as min/max, mean, standard deviation, and number of points missing.
- Plots any compatible variable against any other (currently restricted to two-dimensional data).
- Permits a user to zoom in on any region within the plot.
- Provides the user a choice for a time axis (Greenwich Mean Time [GMT] hours instead of time\_offset).
- Displays the NetCDF file header.
- Allows for various symbol and/or line combinations.
- Supports multiple plot sizes to accommodate various screen sizes.

- Generates appropriate plot labels based on the data being viewed, with smart truncation.
- Shows data values in formatted tables.
- Remembers user preferences from session to session.

## Usage

NCVweb is currently accessible at <http://dq.arm.gov/ncvweb/ncvweb.cgi> for use with the ARM Data Quality Health and Status System. The first displays to appear prompt the user for a datastream and file to be visualized (Figure 1). The data quality site typically keeps the most recent 30 days of data available. The examples in this document use the datastream `sgp1smosE1.a1` and the data file `sgp1smosE1.a1.20020325.000000.cdf`.

Once a file is selected, the user can do one of many things—such as plot the file, or get various detailed information concerning the file. Figure 2 shows the result of plotting a file. If the user does not like the default plot, they may control the appearance and the choice of variables in several ways.

Figure 3 shows how one can pull down the y-axis selection list and choose a new variable to plot. NCVweb automatically generates the labels for variable names and units from the files themselves. NCVweb also allows plotting versus GMT hours instead of `time_offset` as seen in the figures.

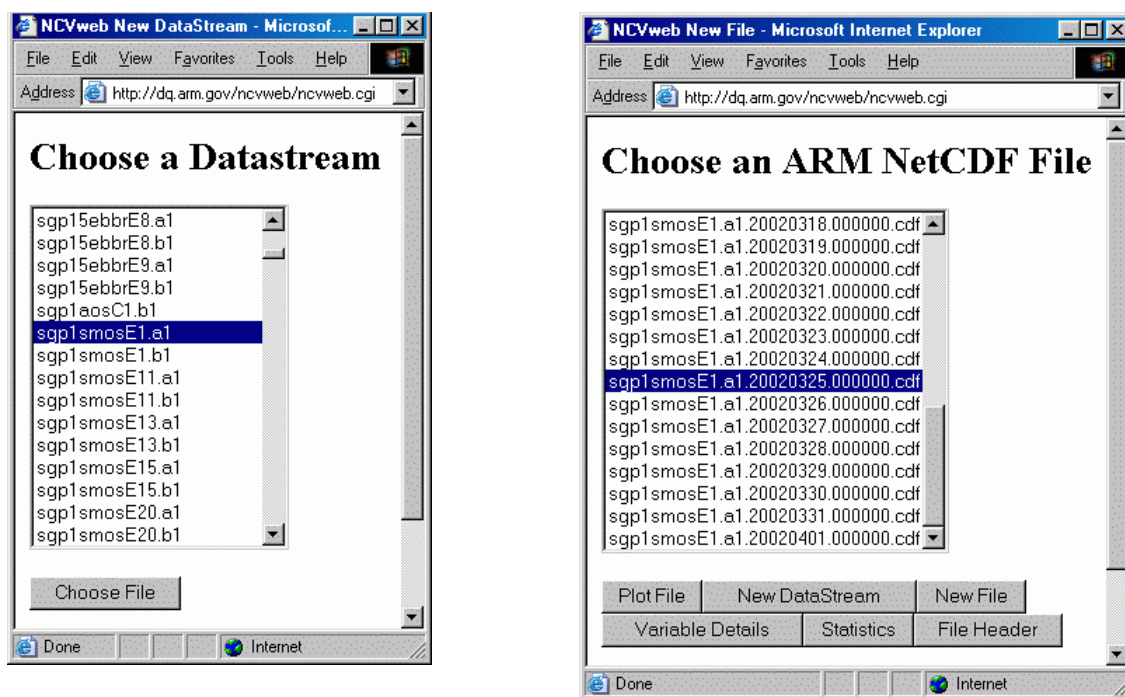


Figure 1. Datastream and file selection.

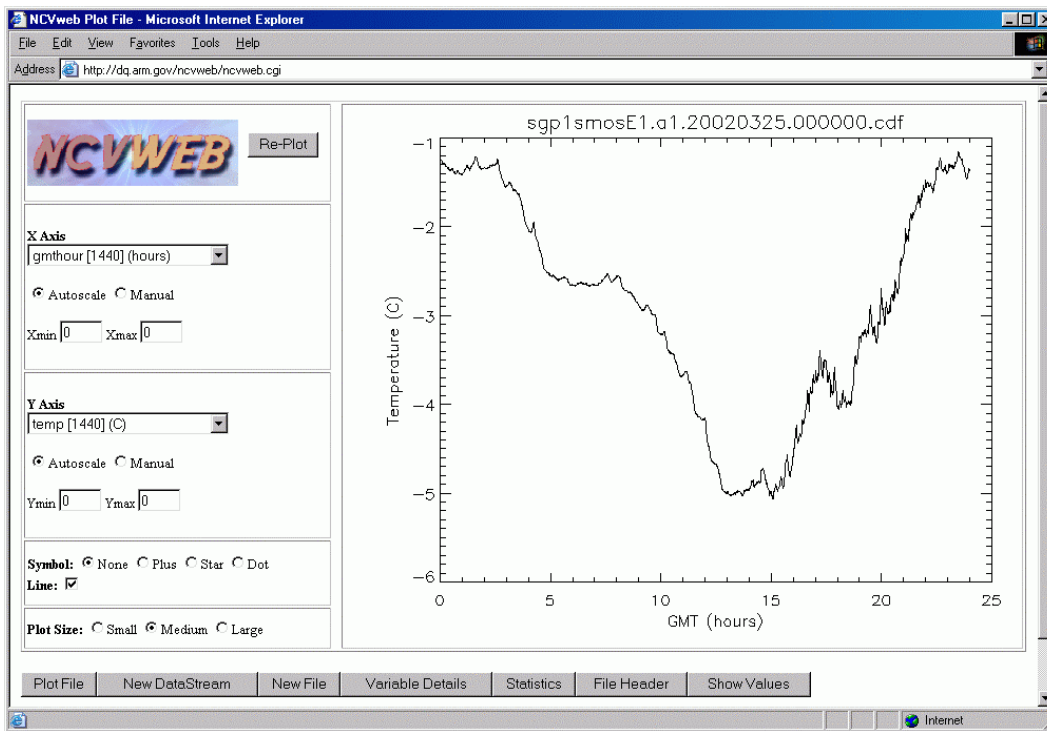


Figure 2. NCVweb plot window.

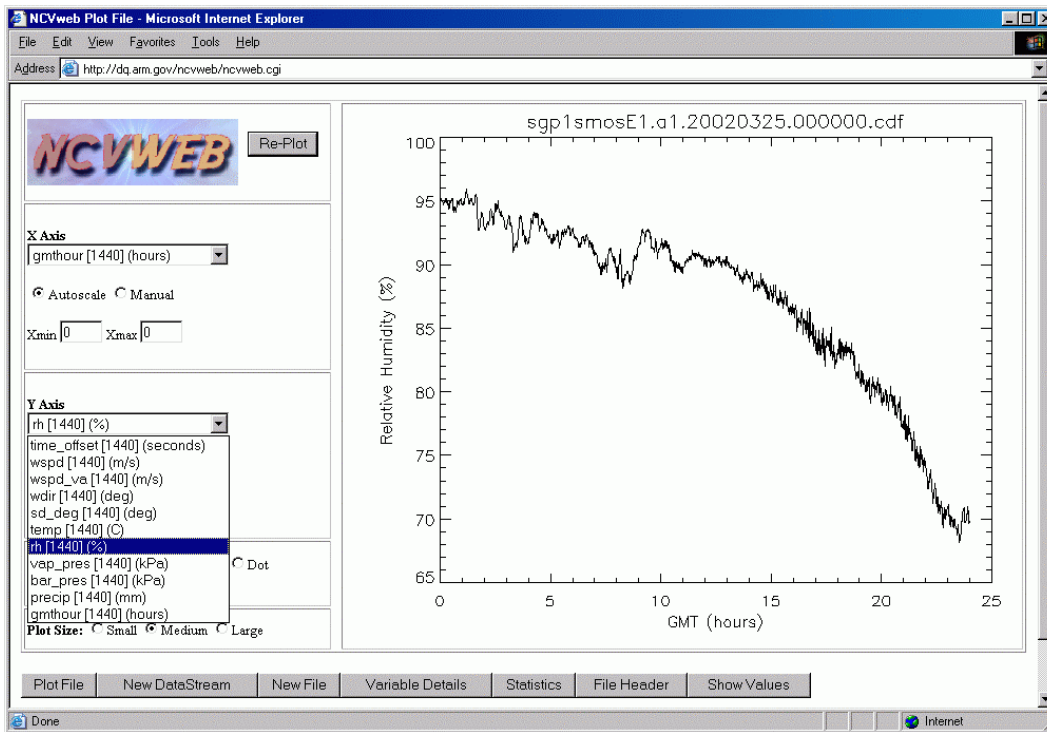


Figure 3. Change variable.

To see detailed information about each variable, the user can select either “Variable Details” or “File Header.” “Variable Details” presents a nicely formatted table displaying the variable names, dimensions, units, and a long descriptive name for each variable (Figure 4). “File Header” displays the entire Data Object Description or NetCDF header for the file. In addition, the user may view some basic statistics on the file selected (Figure 5).

**Variable Details for File: sgp1smosE1.a1.20020325.000000.cdf**

Index	Variable Name	Dimensions	Units	Variable Long Name
0	base_time	[scalar]	seconds since 1970-1-1 0:00:00 0:00	Base time in Epoch
1	time_offset	[time=1440]	seconds since 2002-03-24 23:02:00 0:00	Time offset from base_time
2	wspd	[time=1440]	m/s	Wind Speed
3	wspd_va	[time=1440]	m/s	Wind Speed (vector averaged)
4	wdir	[time=1440]	deg	Wind Direction
5	sd_deg	[time=1440]	deg	Standard Deviation of wind direction
6	temp	[time=1440]	C	Temperature
7	rh	[time=1440]	%	Relative Humidity
8	vap_pres	[time=1440]	kPa	Vapor Pressure
9	bar_pres	[time=1440]	kPa	Barometric Pressure
10	precip	[time=1440]	mm	Precipitation Total
11	lat	[scalar]	degrees	north latitude
12	lon	[scalar]	degrees	east longitude
13	alt	[scalar]	meters above Mean Sea Level	altitude
14	gmthour	[time=1440]	hours	GMT

Plot File | New DataStream | New File | Variable Details | Statistics | File Header

**Figure 4.** Variable details.

A user may zoom in on a particular region of interest. Figure 6 is an example of zooming in on a region from the plot in Figure 2 using the x-range text fields. This feature is particularly useful to help determine if certain features are naturally occurring phenomenon or data quality issues. The user may also see individual data points by selecting from a choice of symbols, or by displaying a textual list of the data values.

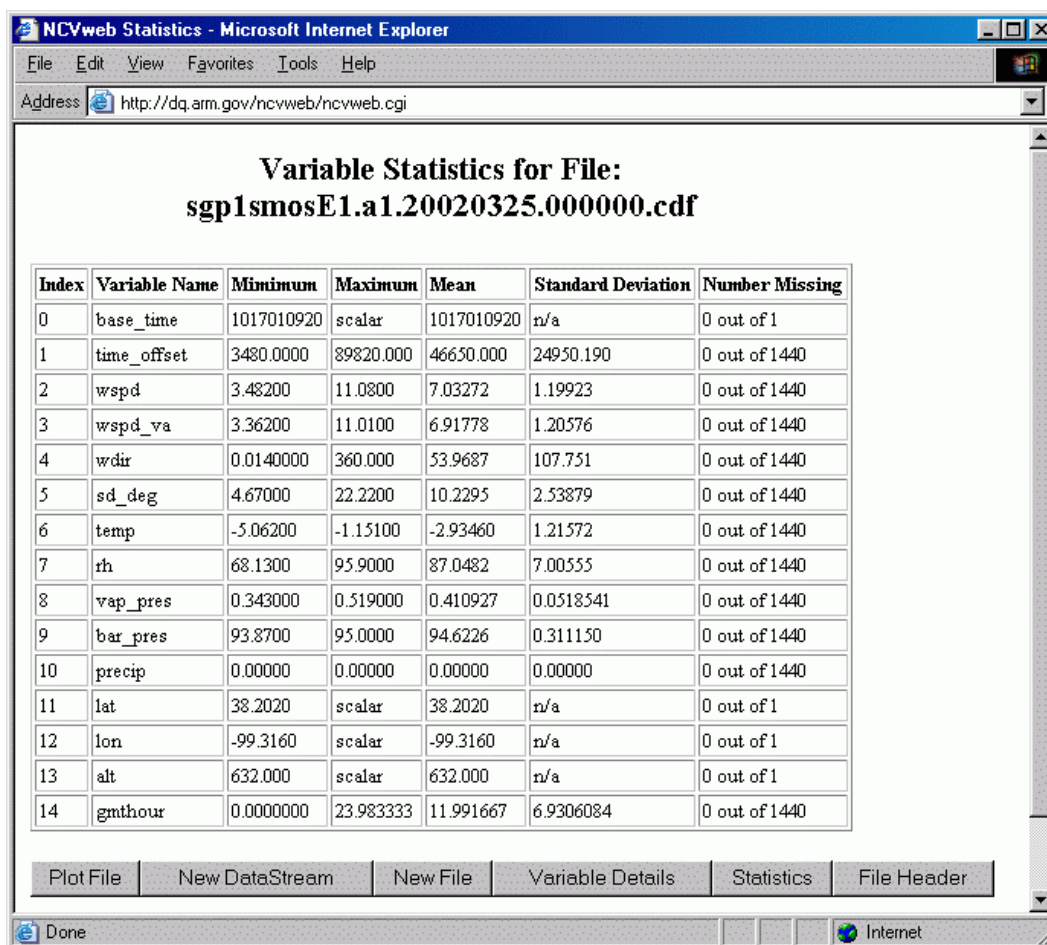


Figure 5. Variable statistics.

## Future Plans

In the future we plan to integrate NCVweb with the ARM archive for viewing historical data as well as data made available as “standing orders.” We expect more sophisticated visualizations to handle higher dimensional datasets as well as a prominent indication of data quality outliers. Requests from the community will also be considered.

## Acknowledgment

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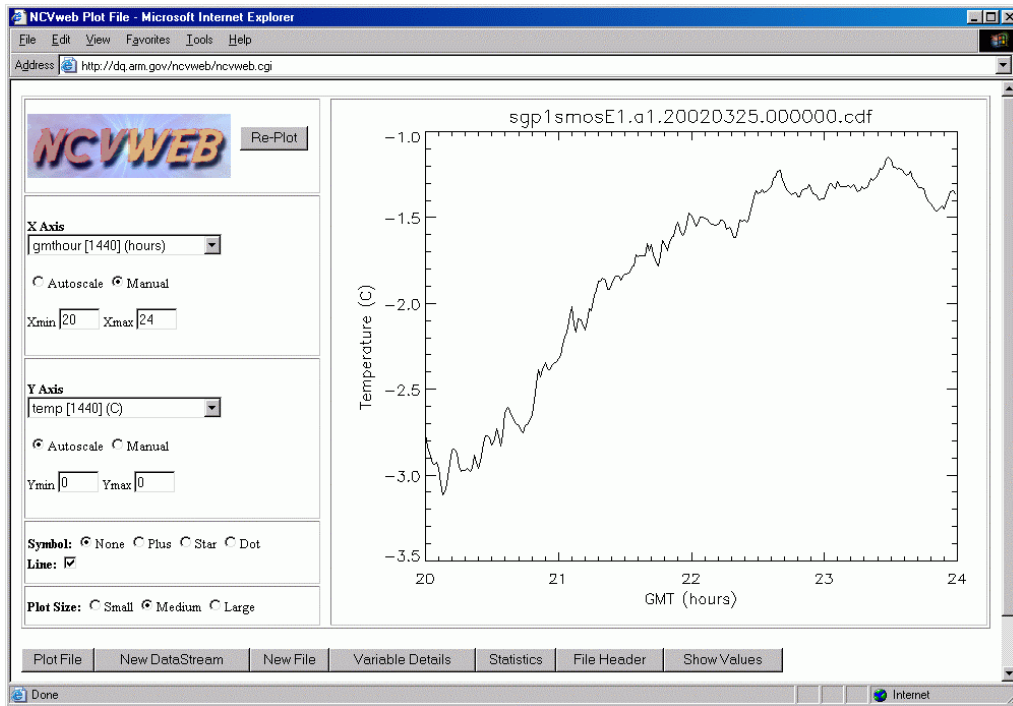


Figure 6. Zoom on region of interest.

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